UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
STREGE, JOHN B

ART UNIT	PAPER NUMBER
2625	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
	09/967,206	THORNBER ET AL.
Office Action Summary	Examiner	Art Unit
	John B Strege	2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>28 September 2001</u>.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) *5-8* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 2* is/are rejected.

7)☒ Claim(s) *3 and 4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All   b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date *1/8/02*.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____ .

Election/Restrictions

1.   Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I.   Claims 1-4, drawn to a method for recognizing objects, classified in class

           382, subclass 118.

   II.   Claims 5-8, drawn to a method of deriving a reflectance function of an

           object model, classified in class 382, subclass 154.

   Inventions I and II are related as combination and subcombination. Inventions in

this relationship are distinct if it can be shown that (1) the combination as claimed does

not require the particulars of the subcombination as claimed for patentability, and (2)

that the subcombination has utility by itself or in other combinations (MPEP §

806.05(c)). In the instant case, the combination as claimed does not require the

particulars of the subcombination as claimed because it concerns recognition using a

general model. The subcombination has separate utility such as modeling the

illumination of a scene for enhancement purposes.

   Because these inventions are distinct for the reasons given above and the

search required for Group I is not required for Group II, restriction for examination

purposes as indicated is proper.

   During a telephone conversation with the attorney of record on 8/23/04 a

provisional election was made without traverse to prosecute the invention of group I,

claims 1-4. Affirmation of this election must be made by applicant in replying to this

Office action. Claims 5-8 are withdrawn from further consideration by the examiner, 37

CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected

invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one

or more of the currently named inventors is no longer an inventor of at least one claim

remaining in the application. Any amendment of inventorship must be accompanied by

a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Drawings

2.   The subject matter of this application admits of illustration by a drawing to

facilitate understanding of the invention. Applicant is required to furnish a drawing

under 37 CFR 1.81. No new matter may be introduced in the required drawing.

Claim Rejections - 35 USC § 102

3.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4.   Claim 1 is rejected under 35 U.S.C. 102(a) as being anticipated by Basri et al.

NEC Technical Report *Lambertian Reflectance and Linear Subspaces* (hereinafter

"Basri").

Claim 1 discloses, A method of recognizing objects under various lighting

conditions. Basri discloses a novel characterization of the variations in lighting that can

be used in object recognition algorithms (as stated in the abstract).

Claim 1 further recites, comprising the steps of:

(a) providing a database comprising a plurality of three dimensional models.

Basri discloses a data base of faces containing 3D models of ten faces (page 19 first

two sentences of section 3.4).

(b) providing an input image. Basri discloses test images of a single individual,

taken across seven different poses and six different lighting conditions (page 19, first

paragraph of section 3.4, seen in figure 4).

(c) positioning each three dimensional model relative to the input image. Basri

discloses obtaining a 3D alignment between the model and the image (page 19, second

paragraph)

(d) determining, for each three dimensional model, a rendered image which is

most similar to the input image. Basri discloses that recognition proceeds by comparing

a new image to each model in turn where the distance between the test image and the

nearest image that the model can render is computed (page 13 second paragraph).

said determining step comprising: (i) deriving a reflectance function that

describes an approximation of the set of all possible rendered images that each three

dimensional model can produce under all possible lighting conditions, said rendered

images including both diffusely and broadened-specularly reflected light. Basri discloses

representing the set of all possible lighting conditions or the set of all functions that are

everywhere positive on the surface of a sphere (at least the second paragraph of page 2). The set of images of a Lambertian object obtained with arbitrary light has be termed "the illumination cone". In order to analyze this the set of reflectance functions obtained under different conditions is used (page 4, first paragraph of section 2). These illumination cones would inherently include diffusely and broadened-specularly reflected light.

and (ii) optimizing the reflectance function to determine rendered image of each model that is most similar to the input image. Basri discloses rendering each model and perfoming non-negative least squares optimization (page 19 third paragraph, and third paragraph page 21)

(e) computing a measure of similarity between the input image and each optimal rendered image; and (f) selecting the three dimensional model corresponding to the optimal rendered image whose measure of similarity is most similar to the input image. Basri discloses that recognition proceeds by comparing an image to a modeld and determining the rate of a correct recogntion (page 19, first paragraph of section 3.4). The results of the recognition are shown in table 2 on page 20.

Regarding claim 2, Basri discloses an approach to handling specular reflection (section 5, pages 24-26). Basri states that surfaces that include specular components can be modeled quite accurately (first paragraph section 5). Basri assumes a scaled-orthographic projection middle that implies that the angle between the camera focal center and the surface normal of a point on the object depends only on the viewing direction and the normal direction (second paragraph).

Allowable Subject Matter

5.   Claims 3-4 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

6.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Georghiades, *From Few to Many: Generative Models for Recogniton Under Variable Pose and Illumination* discloses a recognition model based on variations in illumination.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John B Strege whose telephone number is (703) 305-8679. The examiner can normally be reached on Monday-Friday 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JS

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